

C4553
Log Data Report
Revised

Borehole Information:

Borehole: C4553		Site: 216-U-8 Crib			
Coordinates (WA State Plane)		GWL (ft)¹: Dry	GWL Date: 05/13/04		
North	East	Drill Date	TOC² Elevation	Total Depth (ft)	Type
Not Available	Not Available	May 2004	Not Available	60	Push Hole

Casing Information:

Casing Type	Stickup (ft)	Outer Diameter (in.)	Inside Diameter (in.)	Thickness (in.)	Top (ft)	Bottom (ft)
Threaded steel	0	7	6	1/2	0	60

Borehole Notes:

Zero reference is the ground surface. Casing information was provided by the Fluor Hanford Field Team Leader.

Logging Equipment Information:

Logging System:	Gamma 2A	Type:	SGLS (35%) 34TP20893A
Calibration Date:	03/04	Calibration Reference:	DOE-EM/GJ642-2004
		Logging Procedure:	MAC-HGLP 1.6.5, Rev. 0

Spectral Gamma Logging System (SGLS) Log Run Information:

Log Run	1	2 Repeat	3 Repeat		
Date	05/13/04	05/13/04	05/27/04		
Logging Engineer	Pearson	Pearson	Pearson		
Start Depth (ft)	59.14	52.0	55.0		
Finish Depth (ft)	0.0	46.0	45.0		
Count Time (sec)	200	200	400		
Live/Real	R	R	R		
Shield (Y/N)	N	N	N		
MSA Interval (ft)	1.0	1.0	1.0		
ft/min	N/A ³	N/A	N/A		
Pre-Verification	BA332CAB	BA332CAB	BA341CAB		
Start File	BA333000	BA333061	BA342000		
Finish File	BA333060	BA333067	BA342010		
Post-Verification	BA334CAA	BA334CAA	BA342CAA		
Depth Return Error (in.)	0	0	0		

Log Run	1	2 Repeat	3 Repeat		
Comments	No fine-gain adjustment.	No fine-gain adjustment.	No fine-gain adjustment.		

Logging Operation Notes:

Zero reference was ground surface. Logging was performed with a centralizer installed on the sonde. Pre- and post-survey verification measurements for the SGLS employed the Amersham KUT (^{40}K , ^{238}U , and ^{232}Th) verifier with serial number 118. A repeat log section was acquired at 400 seconds between 45 and 55 ft on May 27, 2004. The purpose of the repeat log was to investigate this interval using a longer counting time to effectively lower the minimum detection limit (MDL) for processed uranium.

Analysis Notes:

Analyst:	Henwood	Date:	06/03/04	Reference:	GJO-HGLP 1.6.3, Rev. 0
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SGLS pre-run and post-run verification spectra were collected at the beginning and end of the day. All of the verification spectra were within the acceptance criteria. Examination of spectra indicates that the detector functioned normally during logging, and the spectra are accepted.

Log spectra were processed in batch mode using APTEC SUPERVISOR to identify individual energy peaks and determine count rates. The post-run verification spectra were used to determine the energy and resolution calibration for processing the data using APTEC SUPERVISOR. Concentrations were calculated in EXCEL (source file: G2AMar04.xls). The casing configuration was assumed as one string of 6-in. casing with a thickness of 1/2 in. to 59.14 ft (total logging depth). Dead time and water corrections were not required.

Log Plot Notes:

Separate log plots are provided for gross gamma and dead time, naturally occurring radionuclides (^{40}K , ^{238}U , and ^{232}Th), and man-made radionuclides. A plot of the repeat log versus the original log is included. For each radionuclide, the energy value of the spectral peak used for quantification is indicated. Unless otherwise noted, all radionuclides are plotted in picocuries per gram (pCi/g). The open circles indicate the minimum detectable level (MDL) for each radionuclide. Error bars on each plot represent error associated with counting statistics only and do not include errors associated with the inverse efficiency function, dead time correction, or casing correction. These errors are discussed in the calibration report. A combination plot is also included to facilitate correlation. The ^{214}Bi peak at 1764 keV was used to determine the naturally occurring ^{238}U concentrations on the combination plot rather than the ^{214}Bi peak at 609 keV because it exhibited slightly higher net counts per second.

Results and Interpretations:

^{137}Cs was detected from 47 ft to total depth (59.14 ft). The maximum concentration was approximately 85 pCi/g at 49 ft. No other man-made radionuclides were detected above their MDL in this borehole during log run 1. However, processed uranium (^{234}Pa at 1001 keV) was observed in spectra just below its MDL (approximately 19 pCi/g) between 46 and 49 ft. A third log run was acquired May 27, 2004 at a longer counting time to provide lower MDLs to quantify the uranium. The MDL for ^{238}U in the repeat section in the absence of contamination (400 sec counting time, log run 3) was approximately 13.9 pCi/g. The MDL in the same interval using a 200 sec counting time (log runs 1 and 2) was approximately 19.0 pCi/g for ^{238}U .

The longer counting time resulted in quantification of ^{238}U at two depth locations (46 and 48 ft) that were observed but not quantified during log run 1 at a 200 sec counting rate. The calculated concentrations at

these depths were 9 and 17 pCi/g, respectively. The repeat data from log run 2 (200 sec) quantified ^{238}U at 48 ft at 13.5 pCi/g (MDL 12.4 pCi/g).

The plots of the repeat logs (log run 2) between 46 and 52 ft and log run 3 between 45 and 55 ft demonstrate reasonable repeatability of the SGLS data for the natural radionuclides at energy levels of 1461, 1764, and 2614 keV. The repeat logs for the ^{137}Cs also show good agreement except for the depth of 47.0 ft. Data were collected at a slightly different depth (46.95 ft) during log run 1.

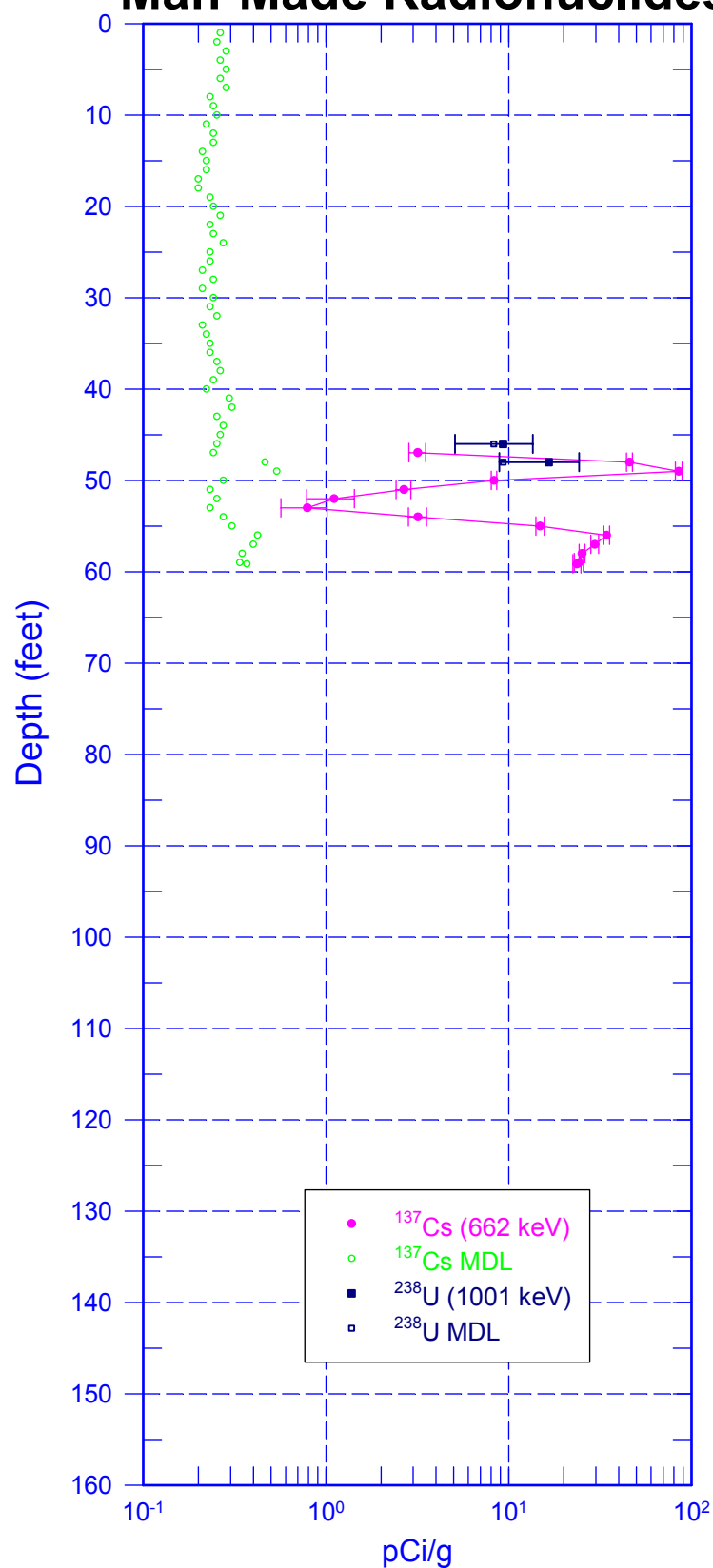
¹ GWL – groundwater level

² TOC – top of casing

³ N/A – not applicable

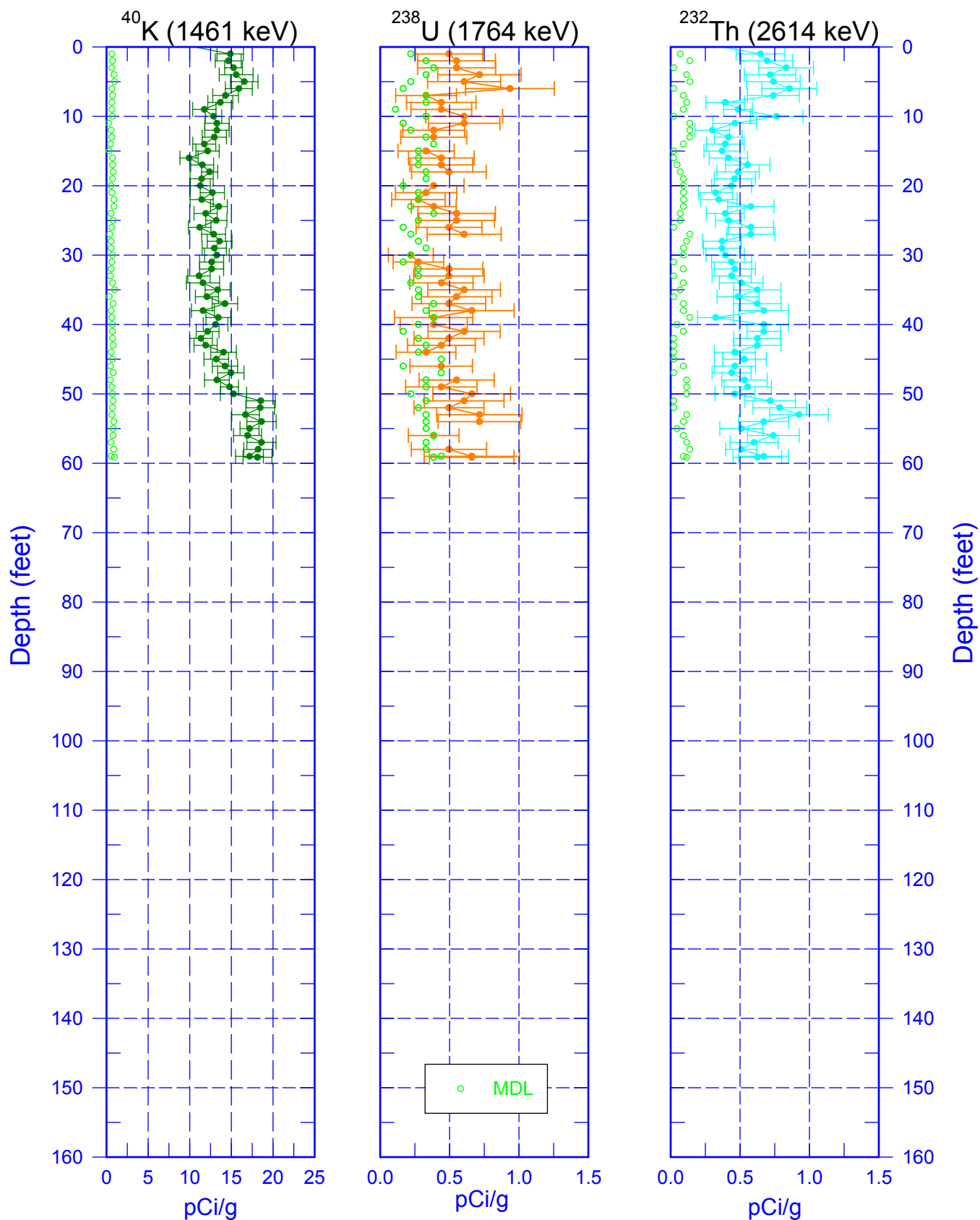
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Man-Made Radionuclides



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Natural Gamma Logs

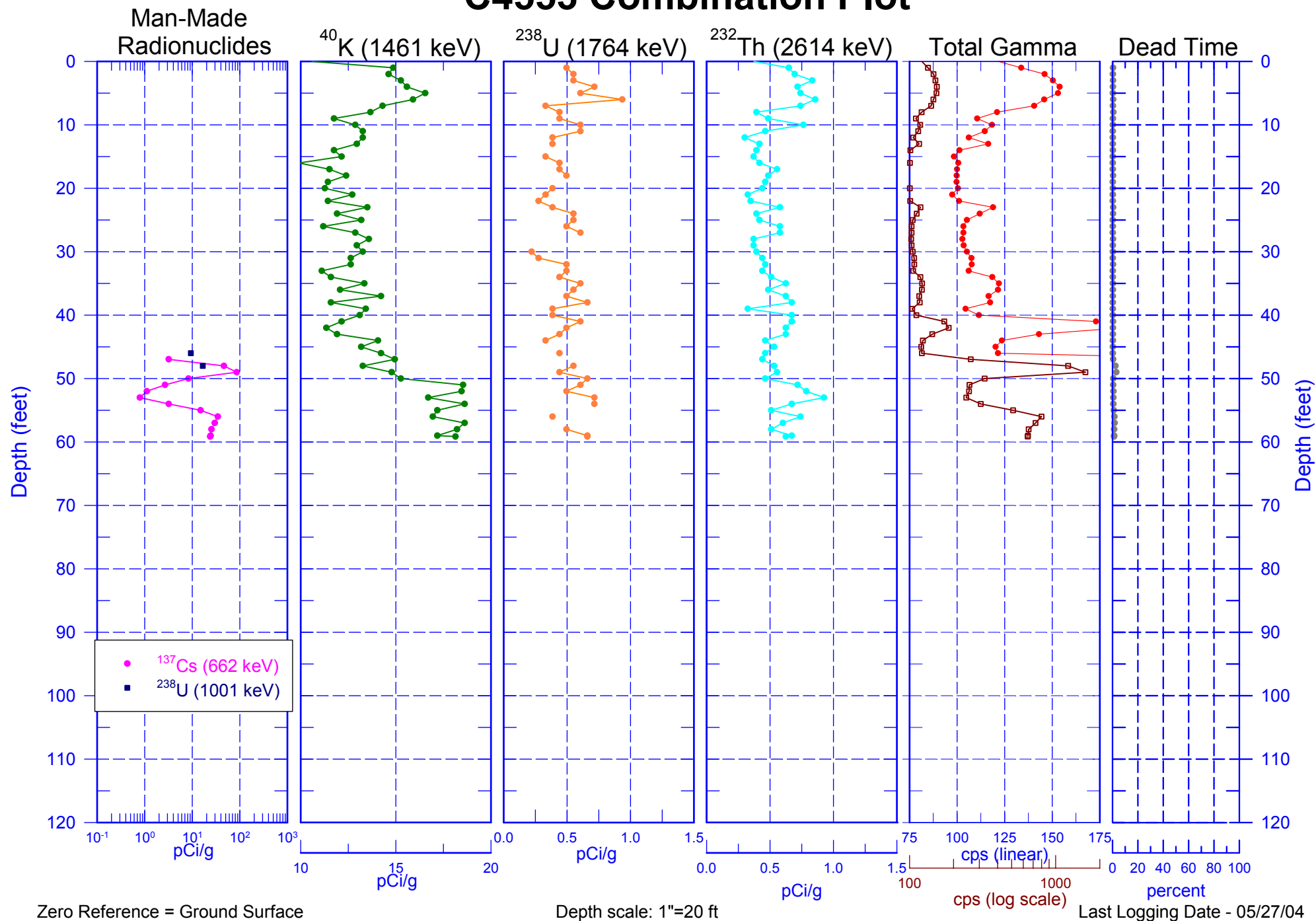


Zero Reference = Ground Surface

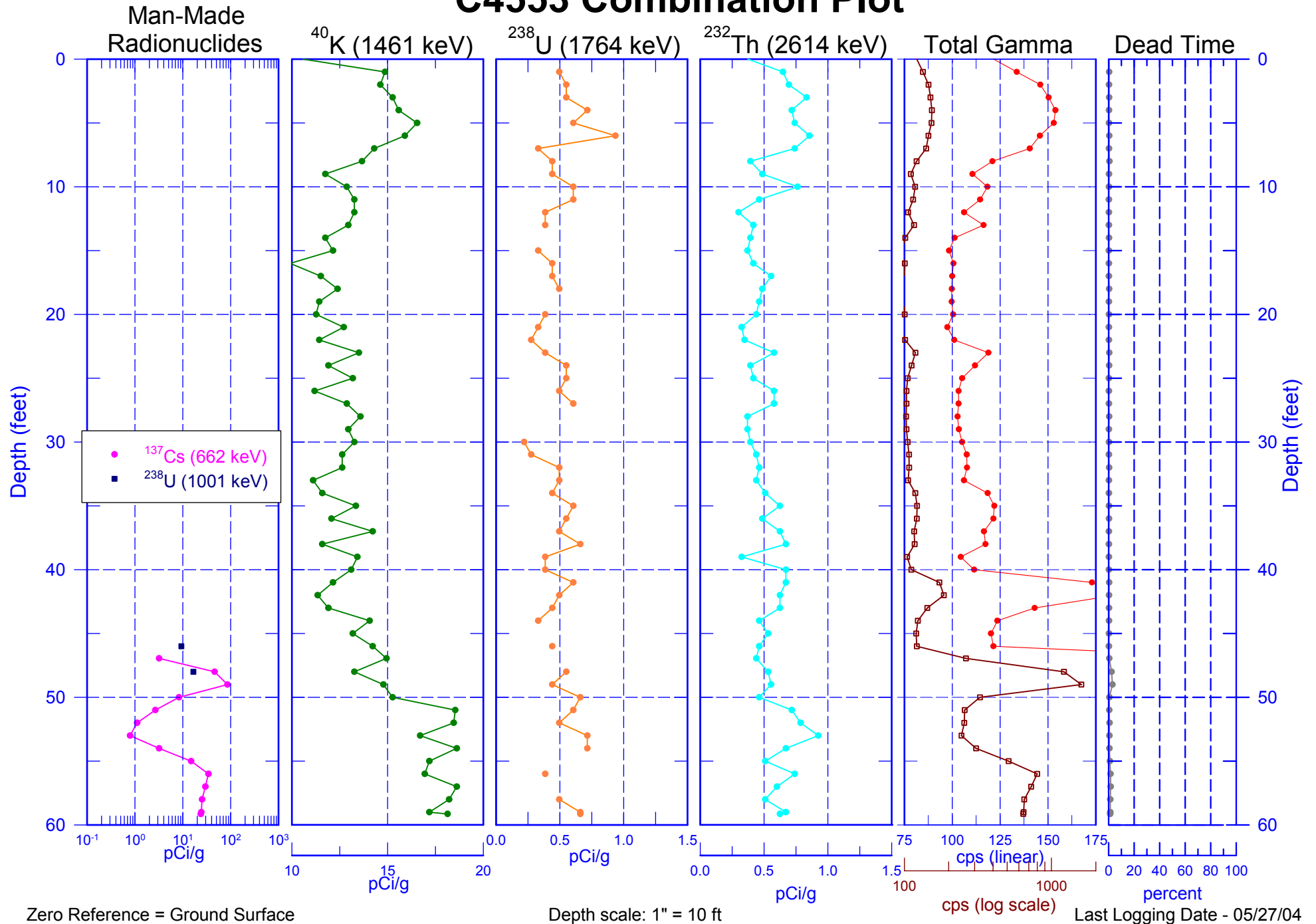
Depth Scale = 1" = 20 ft

Last Log Date - 05/27/04

C4553 Combination Plot

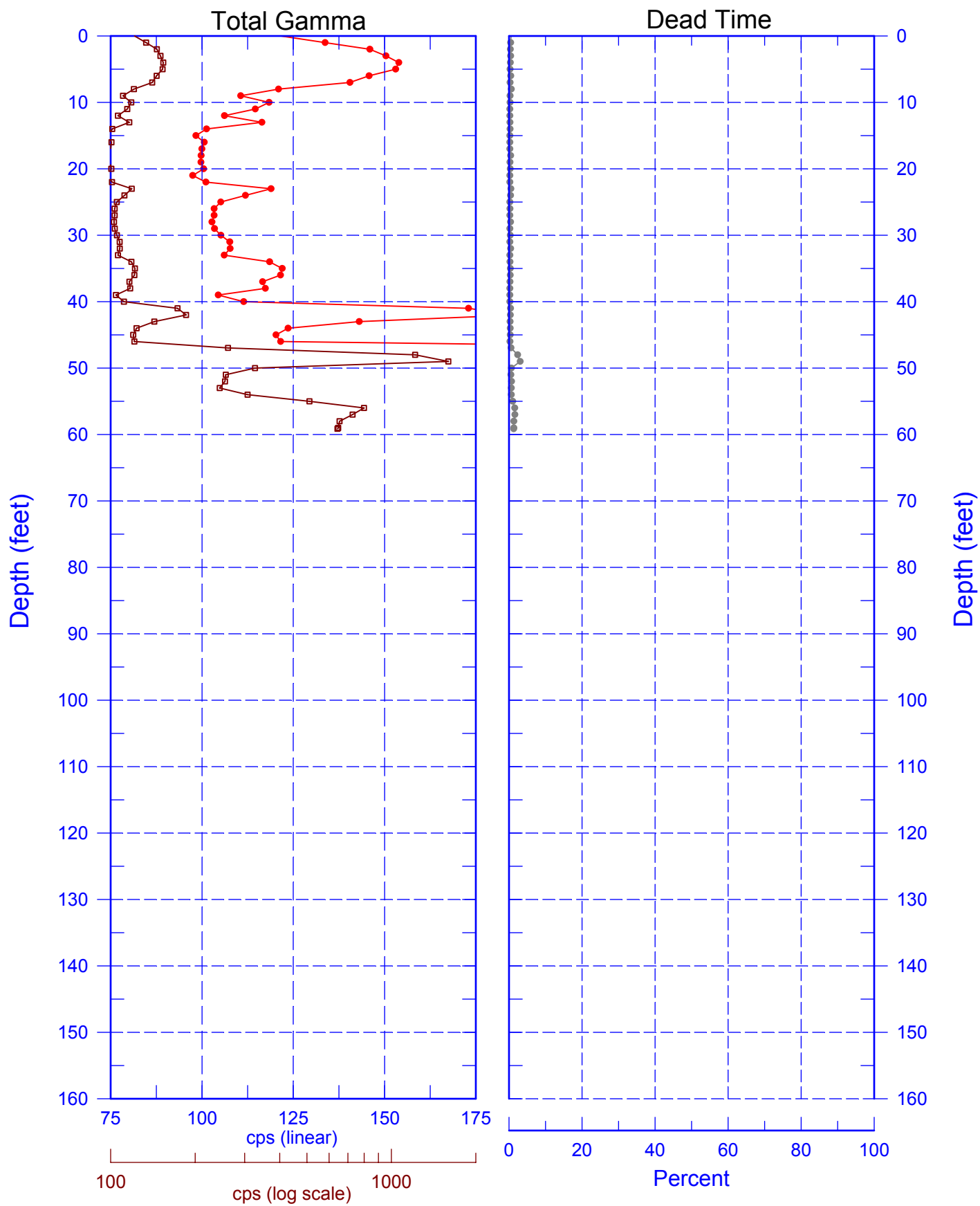


C4553 Combination Plot



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Total Gamma & Dead Time



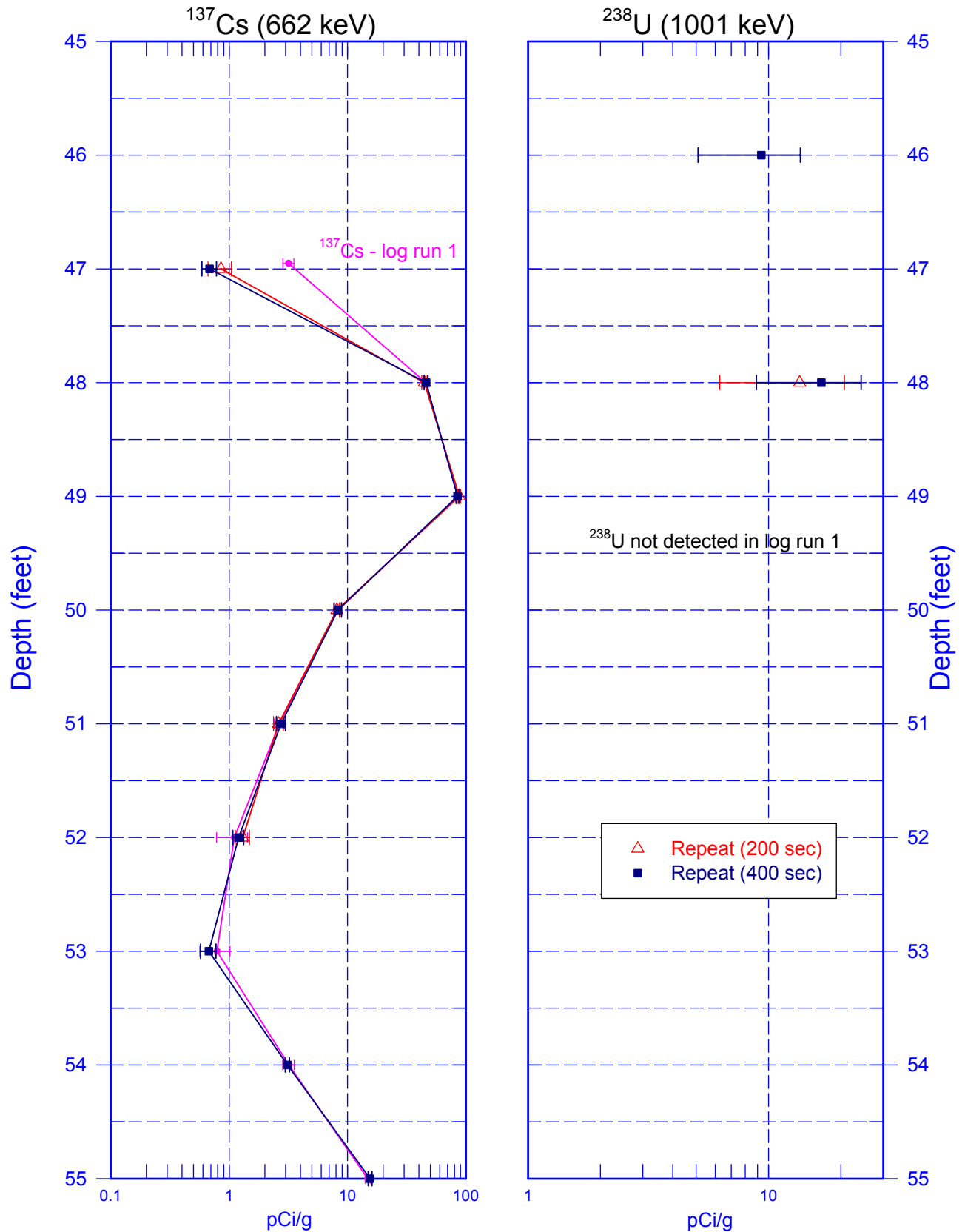
Depth scale: 1"=20 ft

Reference - Ground Surface

Last Log Date - 05/27/04

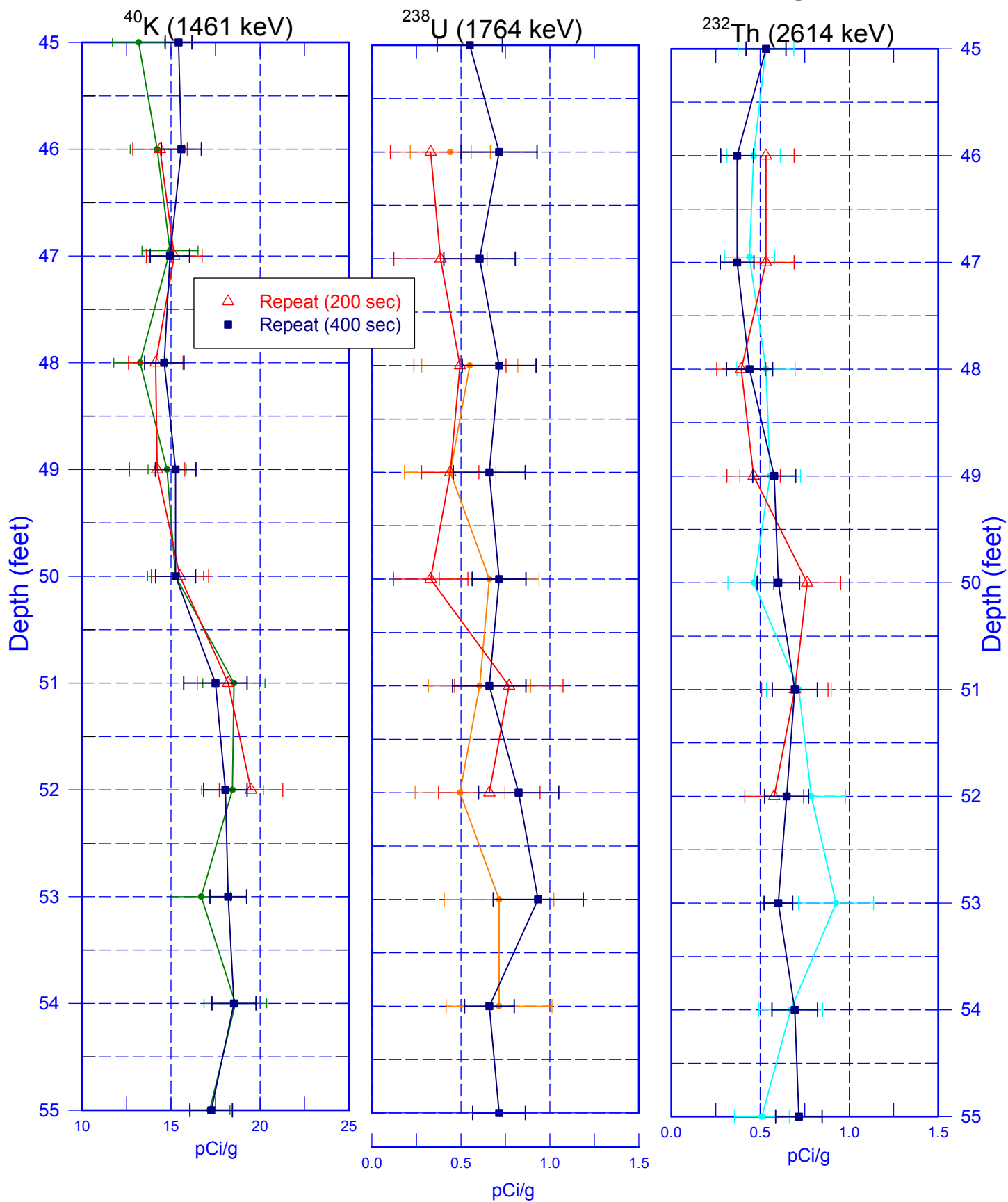
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Repeat Section of Natural Gamma Logs



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Repeat Section of Natural Gamma Logs



Zero Reference = Ground Surface

Last Log Date - 05/27/04